RLC 200 RLC Meter

digimess® expert

Order No.: H.UC 30-00

The RLC 200, an automatic RLC meter, is designed for the manual or fully automatic measurement of components.

Full remote control is possible via an RS-232 interface.

All the usual component parameters such as resistance, conductance, inductance, capacitance, Q factor and loss factor can be determined with a basic accuracy of 0.2%. Deviations from the reference components can be represented either absolutely or relatively.

The information is displayed on a large, backlit alpha-numeric LCD.

In addition to parameter measurements, DC voltages up to 400 V can be measured with a resolution of 100 μV.

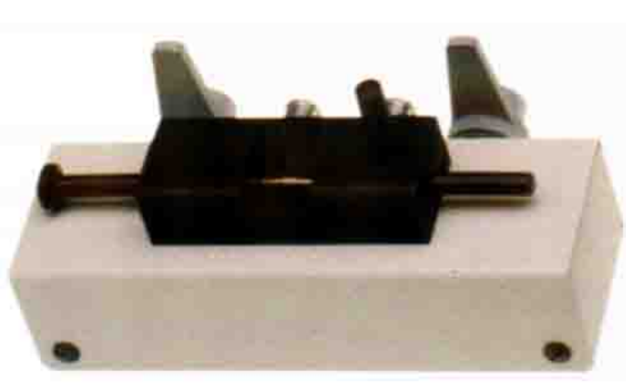
The package includes extensive accessories including an adapter for radial and axial components, an adapter for SMD components and a 4-line measuring cable with Kelvin clips (see overleaf).

As you can see, the RLC 200 offers an unbeatable price/performance ratio.

Delivery package

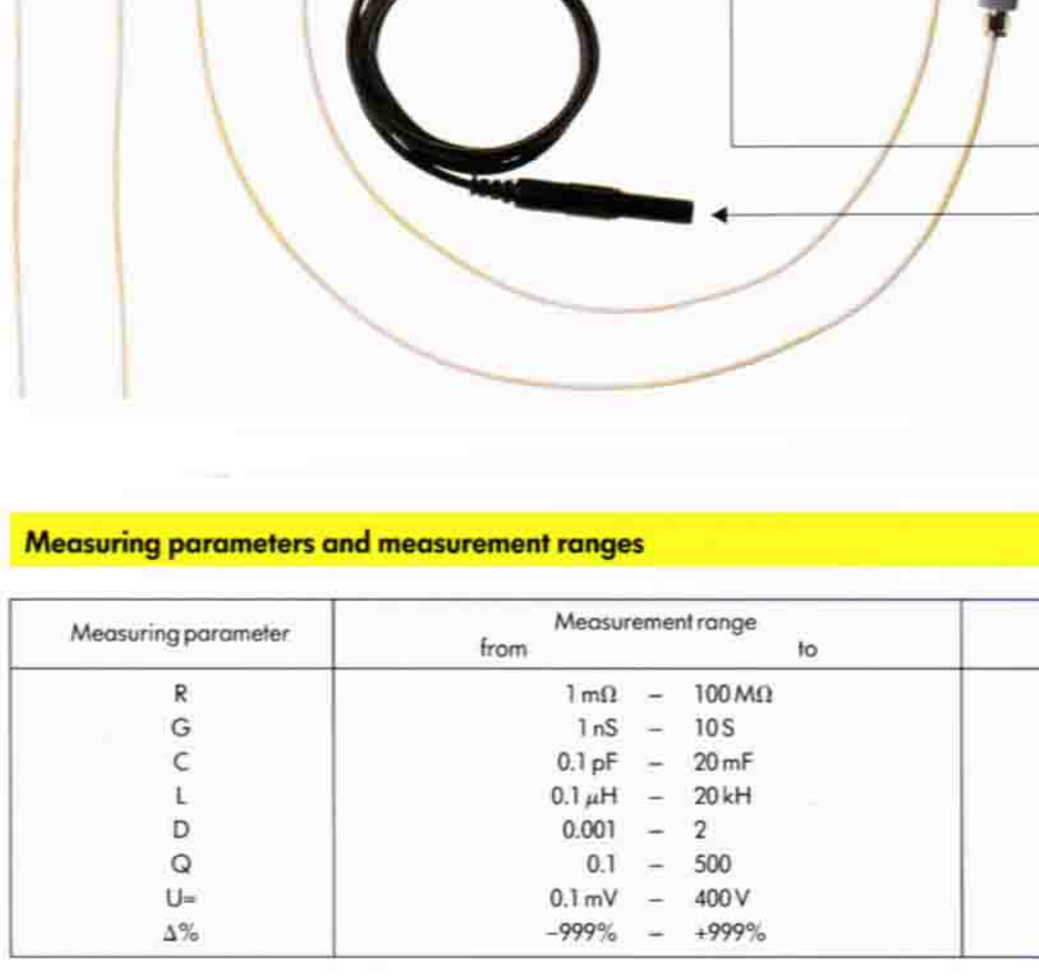
Meter complete with mains cable, replacement fuses and operating instructions, 4-line RLC adapter for radial and axial components, 4-line SMD adapter, 4-line measuring cable with Kelvin clips,

2 voltage measuring cables with integrated test probes, 1 cable for external polarization voltage and 1 measuring earth cable.



4-line SMD adapter

4-line measuring cable with Kelvin clips



Voltage measuring cable with built-in test probes

Measuring parameters and measurement ranges

Measuring parameter	Measurement range from		to	Resolution/dig
R	1 mΩ	–	100 MΩ	1 mΩ
G	1 nS	–	10 S	1 nS
C	0.1 pF	–	20 mF	0.1 pF
L	0.1 μH	–	20 kH	0.1 μH
D	0.001	–	2	0.001
Q	0.1	–	500	0.1
U=	0.1 mV	–	400 V	0.1 mV
Δ%	–999%	–	+999%	0.1%

Measurement specifications

Measuring parameters	R, G, C, L, D, Q, U=, Δ/Δ%
Type of connection	Series or parallel connection with 4-pin arrangement of measuring terminals
Measuring frequencies	100 Hz, 1 kHz
Measuring voltage	50 mV, 1 V
Polarization of test object Internal voltage source External voltage source	 +5 V ≤ +30 V
Selection of measurement range	Automatic or as fixed range
Input resistance of DC voltmeter	> 9 MΩ
Triggering	internal, manual, external via RS 232 C
Measuring time	200 ms
Display	3 ½-digit (measured value and unit)
Interface	RS 232 C
Remote control functions:	R, G, C, L, D, Q, U=, automatic measuring parameter selection, measurement types, measuring frequencies, measuring voltages, automatic measurement range selection or fixed range, absolute and percentage deviation (Δ/Δ%) with input of reference value, triggering and acoustic short-circuit indicator
Data output	Measuring parameter, measurement type, measured value

Measurement tolerances

The following measurement tolerances apply for a reference temperature of + 23 °C ± 1 °C. In the case of defiations from the reference temperature, the tolerance increases by 50% for every 10 °C.

Measurement tolerances for R and G ($Q < 1, D > 1$) and for L and C ($Q > 1, D < 1$)

The measurement tolerance T_{meas} is calculated using the following equation:

$$T_{meas} = \left[\pm\left(A\sqrt{1+P_m^2}\right) \pm K\right] K_t$$

A = basic accuracy in %
P_m = parameter Q (for R-G-measurement) or parameter D (for L-C-measurement)
K = additional error in the last digit (dig)
K_t = temperature coefficient error

The following equations can be used to calculate impedance Z from R, G, C and L:

$|Z| = R = 1/G$

$|Z| = 2\pi fL$ and $|Z| = \frac{1}{2\pi fC}$

Basic accuracy A + additional error K where U_{meas} = 1 V

Impedance |Z|	Measuring frequency 100 Hz	1 kHz
100 mΩ ≤ |Z| < 2 Ω	± 0.5% ± 2 dig	± 0.5% ± 2 dig
2 Ω ≤ |Z| < 20 Ω	± 0.3% ± 2 dig	± 0.3% ± 1 dig
20 Ω ≤ |Z| < 200 Ω	± 0.2% ± 2 dig	± 0.2% ± 1 dig
200 Ω ≤ |Z| < 2 kΩ	± 0.2% ± 2 dig	± 0.2% ± 1 dig
2 kΩ ≤ |Z| < 20 kΩ	± 0.2% ± 2 dig	± 0.2% ± 1 dig
20 kΩ ≤ |Z| < 500 kΩ	± 0.2% ± 2 dig	± 0.2% ± 1 dig
500 kΩ ≤ |Z| < 5 MΩ	± 0.3% ± 3 dig	± 0.3% ± 2 dig
5 MΩ ≤ |Z| < 20 MΩ	± 1% ± 5 dig	± 1.0% ± 2 dig

Where impedance $|Z| \geq 20$ MΩ ($0 < G \leq 50$ nS), U_{meas} = 1 V. The measurement tolerance is specified using the conductance deviation G = ± 2 nS for both measuring frequencies.

Where impedance $|Z| < 100$ mΩ ($0 < R < 100$ mΩ), U_{meas} = 50 mV. The measurement tolerance is specified using the resistance deviation R = ± 2 mΩ for both measuring frequencies.

All percentages refer to the displayed measured values.

Basic accuracy A + additional error K where U_{meas} = 50 mV

Impedance |Z|	Measuring frequency 100 Hz	1 kHz
100 mΩ ≤ |Z| < 2 Ω	not specified	± 0.8% ± 3 dig
2 Ω ≤ |Z| < 20 Ω	± 0.5% ± 3 dig	± 0.5% ± 2 dig
20 Ω ≤ |Z| < 200 Ω	± 0.3% ± 3 dig	± 0.3% ± 2 dig
200 Ω ≤ |Z| < 2 kΩ	± 0.3% ± 3 dig	± 0.3% ± 2 dig
2 kΩ ≤ |Z| < 20 kΩ	± 0.3% ± 3 dig	± 0.3% ± 2 dig
20 kΩ ≤ |Z| < 500 kΩ	± 0.3% ± 3 dig	± 0.3% ± 2 dig
500 kΩ ≤ |Z| < 5 MΩ	± 0.5% ± 5 dig	± 0.5% ± 3 dig
5 MΩ ≤ |Z| < 20 MΩ	not specified	± 3.0% ± 3 dig

Where impedance $|Z| \geq 20$ MΩ ($0 < G \leq 50$ nS), U_{meas} = 50 mV. The measurement tolerance is specified using the conductance deviation G = ± 3 nS for the measuring frequency 1 kHz.

Where impedance $|Z| < 100$ mΩ ($0 < R < 100$ mΩ), U_{meas} = 50 mV. The measurement tolerance is specified using the resistance deviation R = ± 3 mΩ for the measuring frequency 1 kHz.

All percentages refer to the displayed measured values.

Measurement tolerance of loss factor D

The measuring tolerance T_{meas} of loss factor of capacitances D can be calculated using the equation:

$$T_{meas} = 0.1\ D_m \pm D$$

D_m = measured value D (display ed D-value)
D = additional error

Additional error D where f_{meas} = 1 kHz

Capacitance C	Measuring voltage 50 V	1 V
10 pF ≤ C < 100 pF	not specified	± 0.005
100 pF ≤ C < 10 nF	± 0.005	± 0.005
10 nF ≤ C < 100 μF	± 0.004	± 0.003
100 μF ≤ C < 1 mF	± 0.010	± 0.005

Additional error D where f_{meas} = 100 Hz

Capacitance C	Measuring voltage 50 V	1 V
10 pF ≤ C < 1 nF	not specified	± 0.005
1 nF ≤ C < 10 nF	± 0.005	± 0.005
10 nF ≤ C < 100 μF	± 0.003	± 0.003
100 μF ≤ C < 1 mF	± 0.005	± 0.003
1 mF ≤ C < 10 mF	not specified	± 0.010

Measurement tolerance of Q factor

The tolerance is ± 0.2 in the impedance range 100 mΩ ≤ |Z| < 20 MΩ for R or G as test object.

The measurement tolerance of the Q factor of inductances is calculated using the following equation: $T_{meas} = 0.1\ Q_m \pm Q$

Q_m = measured value Q Q = additional error (display ed Q-value)

Additional error Q where f_{meas} = 1 kHz

Inductance L	Measuring voltage 50 mV	1 V
100 μH ≤ L < 1 mH	± 0.5	± 0.4
1 mH ≤ L < 100 H	± 0.3	± 0.3
100 H ≤ L < 1 kH	± 1.5	± 0.5
1 kH ≤ L < 2 kH	not specified	± 0.5

Additional error Q where f_{meas} = 100 Hz

Inductance L	Measuring voltage 50 mV	1 V
1 mH ≤ L < 10 mH	not specified	± 0.3
10 mH ≤ L < 2 H	± 0.7	± 0.3

Measurement tolerance with DC voltage

In all measurement ranges, the measurement tolerance with DC voltage is: T_{meas} = 0.2% ± 1 dig.

The percentages refer to the displayed value.
With a short-circuited input, the display may fluctuate by a maximum of ± 0.2 mV.

The specified values apply for a reference temperature of 23 °C ± 1 °C. In the case of deviations from the reference temperature, the tolerance increases by 50% for every 10 °C.

Environmental conditions

Nominal temperature	+ 23 °C ± 1 °C
Operating temperature	+0 °C ... +50 °C
Relative atmospheric humidity	40 ... 80%
Atmospheric pressure	86 ... 106 kPa
Interference suppression	VfG 243/1991
Power supply	
Operating voltage	Sinusoidal AC voltage 110/220 V (± 10%) (internally switchable) 50 ... 60 Hz (± 5%)
Power consumption	16 VA
Fuses	T 80 mA/250 V (220 V~), T 160 mA/250 V (110 V~)
Protection class	I, in accordance with IEC 348, corresponds DIN VDE 0411 Part 1 E8 1
Dimensions (W × H × D)	291 mm × 108 mm × 259 mm
Dimensions of packing	338 mm × 138 mm × 408 mm
Weight	approx. 2.8 kg
Weight incl. packing and accessories	4.5 kg